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IS 1004 (1980): Valve Grinding Compound [PGD 9: Abrasives]

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“Knowledge is such a treasure which cannot be stolen”





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Indian Standard

# SPECIFICATION FOR VALVE GRINDING COMPOUND

(First Revision)

**1. Scope** — Covers the requirements of valve grinding compound, consisting essentially of abrasive grains suspended in a fluid vehicle (grease) used for grinding internal combustion engine valves, etc.

**1.1** This standard does not cover the requirements of lapping of components.

**2. Grades** — Shall be of the following three grades:

- a) Coarse,
- b) Medium, and
- c) Fine.

**3. Material**

**3.1 Abrasive**

**3.1.1** The abrasive materials used in the manufacture of the compound shall be silicon carbide abrasive containing at least 90 percent of silicon carbide by mass.

**3.1.2** The range of sizes of the abrasive grain used in the three grades of valve grinding compound shall be as under:

Grade	Grit Size of the Abrasive Grain
Coarse	120-150
Medium	180-220
Fine	240 and above

**3.1.2.1** The allowable limits for the sizing of the abrasive grains shall be as given in Table 1.

TABLE 1 LIMITS FOR SIZING OF ABRASIVE GRAINS

Grit Size	IS Sieve Through Which 100 Percent Shall Pass	Control Sieve			Passing Through Control Sieve and Retained on		Cumulative Minimum Through Control Sieve and Retained		Maximum of Three Percent Through IS Sieve Designation
		IS Sieve Designation	Opening mm	Oversize on Percent Max	IS Sieve Designation	Percent Max	On IS Sieve Designation	Percent	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
120	15	12	0.124	15	10	30	10 and 9	60	6
150	15	10	0.104	15	9 and 8	40	9, 8 and 6	75	5
180	12	9	0.089	15	8 and 6	40	8, 6 and 5	65	—
220	10	8	0.075	15	6 and 5	40	6, 5 and 4	60	—
240	9	8	0.075	5	6 and 5	8	6, 5 and 4	38	—

**Note** — For details of IS Sieve see IS : 460 (Part I to Part III) - 1978 'Test sieves' (second revision).

Adopted 30 September 1980

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### 3.2 *Vehicle*

**3.2.1** The vehicle used shall be grease, either soda-based or lime-based or oil having the following characteristics:

- a) under normal conditions of use it shall not allow the abrasive to produce deep surface marks,
- b) shall ensure cool cutting,
- c) shall be sufficiently viscous to hold the abrasive grains in suspension under the operating conditions,
- d) shall be able to disperse the abrasive grains uniformly,
- e) shall not be appreciably affected by changes in temperature, and
- f) shall not require any inflammable substance for cleaning it from the work piece.

**3.2.2** In addition to the characteristics mentioned in **3.2.1**, the vehicle used shall comply with the following requirements:

a) Drop point, minimum (for grease) shall be 50° C and shall be determined according to the method given in IS : 1448 [ P : 52 ]-1971 'Methods of test for petroleum and its products: P 52 Drop point; and

b) pH value, maximum, shall be 7 and shall be determined according to the method given in IS : 5741-1970 'Methods for determination of pH'.

### 4. Composition of Compound — The compound shall have the following composition:

Abrasive, <i>Min</i>	30 percent by weight
Vehicle	Remainder

**5. Chemical Analysis** — The silicon carbide content in valve grinding compound shall be determined as described in Appendix A.

### 6. Designation

**6.1** Valve grinding compound having silicon carbide abrasive, of fine grade and conforming to this standard, shall be designated as:

Valve Grinding Compound, Fine, IS : 1004

**7. Packing** — The compound shall be packed in suitable containers.

**8. Marking** — Containers containing the compound shall be marked with the following:

- a) Grade,
- b) Weight of content, and
- c) Manufacturer's name or trade-mark.

**8.1 ISI Certification Marking** — Details available with the Indian Standards Institution.

## APPENDIX A

( Clause 5 )

### DETERMINATION OF SILICON CARBIDE CONTENT IN VALVE GRINDING COMPOUND

#### A-1. Method

**A-1.1** Take five grams of the valve grinding compound and dissolve it in carbon tetrachloride or trichloro-ethylene or any other suitable solvent. After degreasing the valve grinding completely dry the abrasive material at 110° C for one hour and weigh again.

**Calculation**

$$\frac{\text{Percentage of abrasive material in valve grinding compound}}{\text{Mass of valve grinding compound (5g)}} = \frac{\text{Mass of degreased and dry abrasive material} \times 100}{\text{Mass of valve grinding compound (5g)}}$$

**A-1.2** Take the degreased and dry abrasive material and crush it in an agate pastle mortar to pass through 150 mesh sieve. Take one gram of this sieved sample ( $W_1$ ) in a 30 ml platinum crucible and add 15 to 20 ml of hydrofluoric acid and three to four drops of sulphuric acid ( $H_2SO_4$ ) and evaporate slowly on a sand bath to volatilize the free silica and silica combined as silicates. Evaporate excess of sulphur trioxide ( $SO_3$ ) fumes and fuse with approximately 10 grams of potassium bisulphate ( $KHSO_4$ ) at red heat, cool, extract the melt with 75 ml of hot water and 20 ml of hydrochloric acid ( $HCl$ ), and wash the silicon carbide residue with hot water acidulated with hydrochloric acid. Burn off the filter paper and ignite the silicon carbide residue at 800°C, weigh the silicon carbide ( $W_1$ ).

Combine the extracted liquid and the above filtrate obtained after washing silicon carbide. Add 5 ml of sulphuric acid and evaporate on a sand bath until fumes of  $SO_3$  appear. Cool, dilute with hot water, filter and wash with hot water acidulated with hydrochloric acid. Burn off the filter paper and ignite to a constant weight. The silica is volatilized according to the above procedure ( $W_3$ ).

**Calculation**

$$\text{Percentage of silicon carbide} = \frac{W_1 \times 100}{W_3} - + \frac{W_3 \times 0.666 \times 100}{W_3}$$

where

$W_1$  = weight of residue in platinum crucible,

$W_3$  = weight of sample taken, and

$W_3$  = weight of silica in the filtrate.

**E X P L A N A T O R Y N O T E**

This standard was first published in 1956. The committee responsible for its preparation, reviewed and decided to revise it. In this revision, the following have been incorporated:

- Method of chemical analysis of the abrasive ( silicon carbide ),
- Modified vehicle characteristics, and
- Title changed from ' valve grinding paste ' to ' valve grinding compound '.

Regarding the method of determination of silicon carbide contents in valve grinding compound, considerable assistance has been derived from Annual Book of ASTM Standards 1979 : Part 17 — Refractories, Glass, Ceramic Materials ; Carbon and Graphite Product ( page 485 — 486 ).

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TO  
IS 1004 : 1980 SPECIFICATION FOR VALVE  
GRINDING COMPOUND  
( *First Revision* )

( *Page 3, clause A-1.2, para 2, last line* ) — Substitute 'The silica is volatilized according to the above procedure. The silicon thus obtained is weighed ( $W_3$ ).' for 'The silica is volatilized according to the above procedure ( $W_3$ ).'

( BP 09 )

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